POWERSOURCE

ENVIRONMENTAL REPORT 17

FALL 2017 » TOTAL ECLIPSE » GREEN STRIPE » CARNIVOROUS & INVASIVE PLANTS » SC SHRIMP

from the **EDITOR**

This is a special issue of PowerSource for Santee Cooper, and it is my favorite to write for and edit. The reason for that is our fall issue doubles as our Annual Environmental Report.

Each year, we focus on environmental stories. This allows us to get out of our offices, get in touch with Lowcountry flora and fauna, and share with you Santee Cooper's environmental accomplishments and endeavors throughout the state.

Environmental stewardship is a foundation for Santee Cooper, and we've been leading the way for decades. In 2001, Santee Cooper was the first utility in the state to generate renewable energy. The Give Oil For Energy Recovery, or GOFER, program has 27 years under its belt and continues to keep millions of gallons of used motor oil out of freshwater sources. We work to continue limiting and lowering emissions, and we lead the country with our innovative approach of beneficially using coal ash.

In this issue, you'll read how Darlington Raceway's Labor Day Weekend events were driven by 100 percent homegrown Green Power, generated by Santee Cooper and provided by Pee Dee Electric Cooperative. Painting the wall green on the 4th turn at Darlington Raceway was a labor of love and a visual reminder of how important it is to be kind to our planet. That's just one way we're teaming up with the state's electric cooperatives to make our world a little greener.

I know you'll also enjoy our story about a number of intrepid plants that adapted to harsh soil conditions by luring unwitting insects into their lairs. It's a story that travels as far away as Africa and as near as Lewis Ocean Bays Heritage Preserve in Horry County and Old Santee Canal Park in Berkeley County.

We round out the rest of the issue with an overview of Santee Cooper's yearly environmental data, a recap of the Great American Solar Eclipse, the delicious optimism of

the people of South Carolina's shrimping industry, and the discovery of – and subsequent plan to control – an aggressive, invasive plant in Lake Marion.

My hope is you'll enjoy the stories, people and places in this issue as much as I do.

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ENVIRONMENTAL REPORT 17

santee cooper®

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Photo by Paul Zoeller

Turn 4 at Darlington Raceway was painted green designating that Santee Cooper-produced Green Power was the renewable electricity consumed at the track "Too Tough to Tame" during this year's Labor Day weekend races. Paul Menard (top) and Carl long drive their Chevrolet's past the marker on Sept 3.

“It’s like the moon eating the sun.”

From top: James Ross with the Lowcountry Stargazers views the beginning of the eclipse with a filtered telescope.

Ben, Tim and George Hammond from Manchester, England, view the eclipse at Old Santee Canal Park.

On the shore of Lake Marion, faces and cameras look to the sky during totality.

Young George Hammond had a summer of firsts. The English sandy-haired, blue-eyed 8-year-old from Manchester was visiting America for the first time with his family. He and his brother Ben eagerly described stories of looking out at the mammoth buildings in New York City from the top of the Empire State Building, watching the White Sox take on (and lose to) Kansas City and whitewater rafting in Georgia.

Their next big adventure was just ahead of them – the Great American Eclipse. Or, as George imagined it, “the moon eating the sun.”

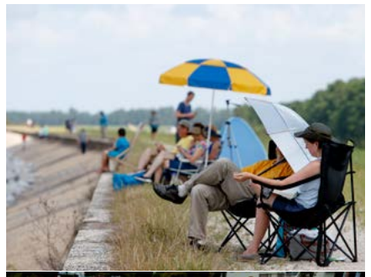
There were hundreds of families that came to Old Santee Canal Park in Moncks Corner for its Total Eclipse party on Aug. 21. There was an impressive line, with some queueing up more than three hours before the gates opened at 9 a.m. Certified solar eclipse glasses were a much sought-after commodity, and Old Santee Canal Park had them for free for the first 1,000 visitors to the park.

Betsy Goldsmith of Manhattan was one of the first in line. At 8:45 a.m., she stood patiently, holding on to the park’s gate with anticipation.

Photography by Paul Zoeller

By Nicole A. Aiello

For more information on the next eclipse over America on April 8, 2024, visit eclipse.gsfc.nasa.gov.



At left, the point of totality shows the corona of the sun around the moon. Amateur astronomers flocked to Lake Marion and Old Santee Canal Park for their chance to view the eclipse.

"We knew that Charleston is a beautiful city and a great place for a destination," Goldsmith said. "The number one thing we wanted to do, though, was see the eclipse here. We found out about Old Santee Canal Park by reading about it on the Stargazers' site."

Overall, around 3,200 people dotted the grounds of the park, lounging in camp chairs, lying on blankets and soaking in the sun on the lush hillside overlooking the historic Stony Landing House.

"It's humbling that so many people wanted to share this lifetime event with us," said Brad Sale, park director. "There are people here from all over the country and from other countries. They could have seen the eclipse from anywhere in the region, and the fact they chose our park as a beautiful backdrop for this solar eclipse is an honor."

The free, fun, family-friendly event featured the Lowcountry Stargazers, a local club of passionate, amateur astronomers. They brought nine solar telescopes, fitted with special filters to protect viewers' eyes, to the park for public viewing of the event.

Around 1:15 p.m., as the moon began its slow dance with the sun, people of all ages lined up at the Lowcountry Stargazers' telescopes to get a closer view. Others put on their glasses and pointed to the sky.

One person stood out in the crowd. With a welcoming smile and an affable personality, James Ross with the Lowcountry Stargazers effused a genuine and heartfelt enthusiasm about the eclipse that was contagious.

"What we want to do is make sure the eclipse is safe and fun for everyone. We have scopes set up for people to use, and we're giving presentations in the visitor's center. They learn about astronomy, eclipses and the wonderful things that are happening in the heavens," said Ross.

Unfortunately at Old Santee Canal Park and the lower part of Lake Moultrie, a mass of storm clouds obscured the sun before totality began. Although there was disappointment at the park, there also was awe as day turned to night and crickets started to sing. One man stood on his car shouting in joy at the awesomeness of it.

Meanwhile, out on nearby lakes Marion and Moultrie, hundreds of boats bobbed in the water and, on the shore, people lazed on the grass or on docks and piers. For many on the lakes, the clouds parted just in time to watch the moon overshadow the sun, its corona the only indication it was still there.

While South Carolinians had a view from the surface of the Earth, NASA's Lunar Reconnaissance Orbiter (LRO) was watching the eclipse's effects from the moon. According to NASA, as the LRO crossed the lunar south pole, the shadow of the moon was racing across the United States at 1,500 mph.

That may sound like an abnormal occurrence. According to NASA's website, it was far from unusual.

"While the thrill of the total eclipse was in experiencing the shadow of the Moon sweep across us on Earth, on the Moon this was just another day. The lunar nearside was one week into its two-week night, while the Sun shone on the far side in the middle of its two-week day. Because solar eclipses do not affect the health or power supply of the spacecraft, LRO operated normally during the total solar eclipse."

Whether on Earth, on the moon, or through photographs and video, the Great American Eclipse was one for the record books and quite a sight to behold.

RACING TOWARD A GREENER SOUTHERN 500

By Willard Strong

Photography by Paul Zoeller

Turn 4 at Darlington Raceway was painted green designating that Santee Cooper-produced Green Power was the renewable electricity consumed at the track "Too Tough to Tame" during this year's Labor Day weekend.

AS the green flag was waved furiously, drivers took their positions, engines revved and the pace car conceded its guidance. The crowd of 60,000 was on its feet, electric with excitement and cheers. It was Labor Day weekend and the Bojangles' Southern 500 – complete with all the pomp and circumstance of a hallowed NASCAR race – had officially begun.

While the thrill of the race was in full force on the track and in the stands, the excitement didn't stop there. Behind the scenes Darlington Raceway had once again made the environment a priority. For nearly a half-dozen years, the Southern 500 has "gone green" with Green Power. Renewable energy produced by Santee Cooper and distributed to the raceway by Pee Dee Electric Cooperative covered the track's power requirements. The Saturday race, the SportClips 200, was also part of the green goings-on.

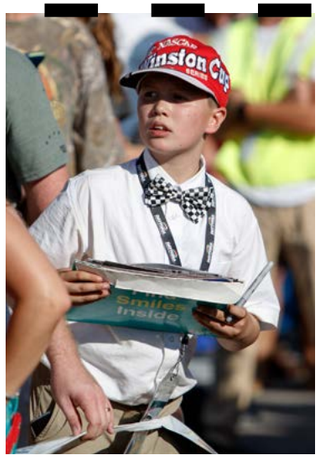
The track consumes about 1,200 megawatt hours of power during the Labor Day weekend. Santee Cooper generates 28 megawatts of Green Power primarily from six landfills where methane gas from decaying garbage provides the fuel for generators. Other sources include solar and wind.

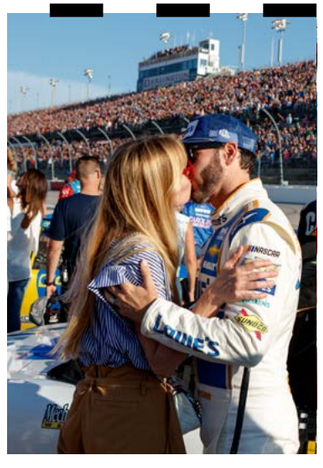
An important aspect of Santee Cooper's Green Power is that it is Green-e Energy certified. That means it meets the environmental and consumer-protection standards established by the nonprofit Center for Resource Solutions, based in San Francisco.

"We were proud to say that our Monster Energy NASCAR Cup Series Bojangles' Southern 500 race weekend was 100 percent powered by green energy, thanks to Pee Dee Electric Cooperative and Santee Cooper," said track President Kerry Tharp. "Darlington Raceway takes great pride in being a facility that is powered by renewable energy. We appreciate our strong relationship with our electric providers and I think we put on a great race weekend for our fans."

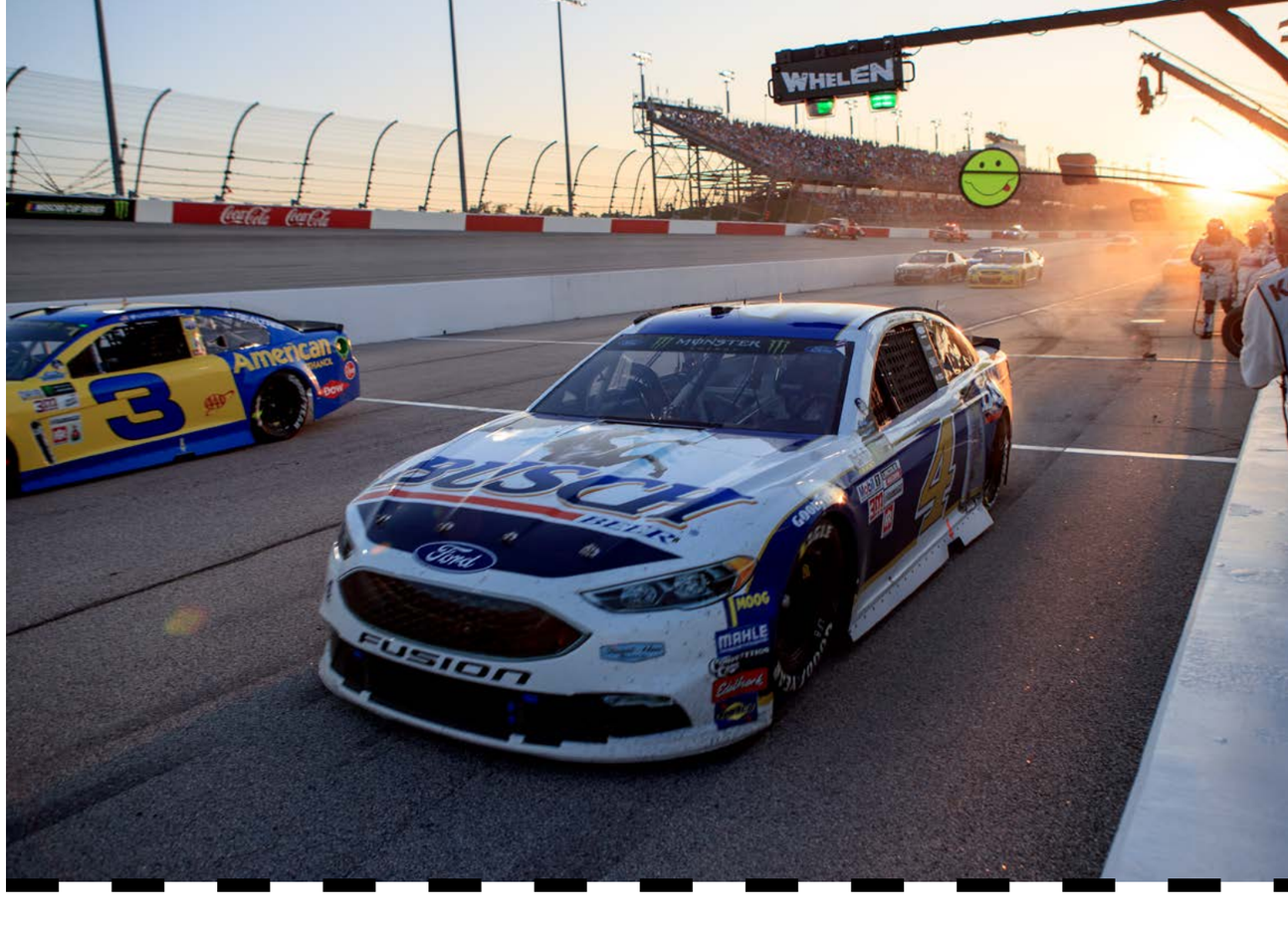
And fans agree. Joe Fleming, who journeyed from Lehigh Valley, Pa. with his son, Joey, said, "Going green is always good. This is an impressive thing to do."

"I feel like it's an excellent thing to do," said Kristin Sebolt, a fan from nearby Florence who was there to cheer on Dale Earnhardt Jr.'s last Darlington race. "I'm delighted to know that this is happening. I'm glad they're doing it."





Scenes from the infield during the Bojangles' Southern 500.



Above: Austin Dillon (left) and pole sitter Kevin Harvick get back in the running following a pitstop.

Even the famed "Darlington stripe" got in on the festivities. Drivers earn their "stripe" when a race car scrapes a guard rail or barrier on an outside turn.

"We painted a green stripe along the wall at turn four," said Jeff Singletary, the Pee Dee Electric Cooperative's vice president of marketing. "That stripe represented the Green Power used throughout the weekend by NASCAR fans, crews and drivers. We're always proud to partner with Santee Cooper and Darlington Raceway in bringing this Green Power event to the area. We're big supporters of clean, renewable energy and were extremely pleased to host this event once again."

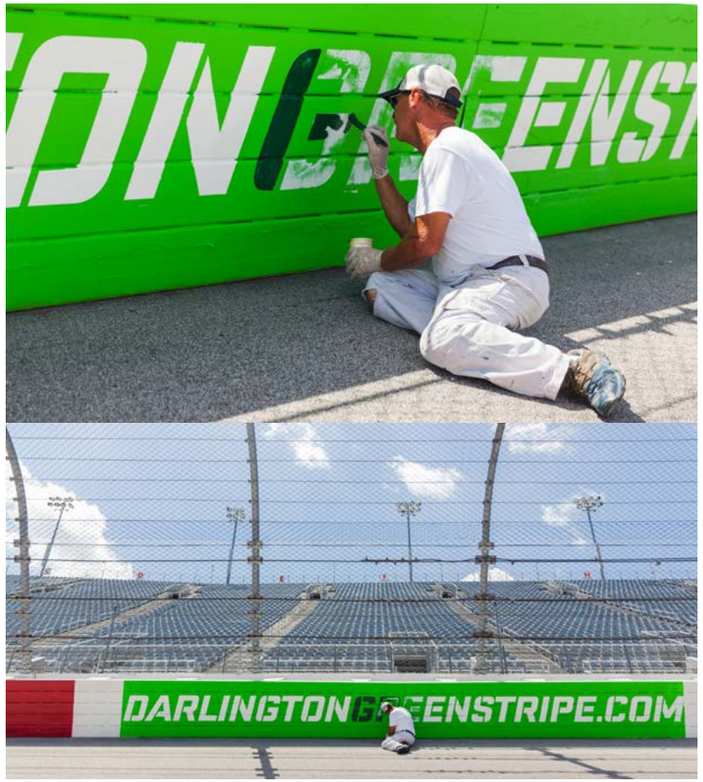
There are other ways NASCAR races have evolved to be more environmentally friendly in the 21st century. For example, all of the used motor oil and gear oil discarded by NASCAR teams is recycled.

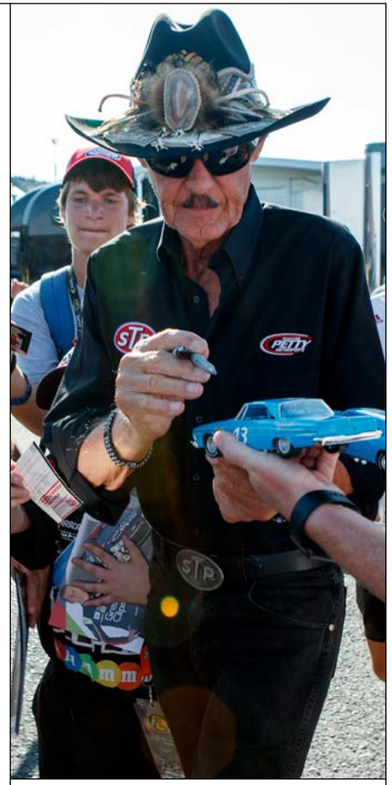
NASCAR is also concerned about the kind of gasoline used in the race cars. It is 15 percent ethanol and 85 percent gasoline, a super-high octane fuel specifically refined for high horsepower engines. Made from corn, ethanol has provided our nation's farmers with another market for their crop. E15, as it's called, results in lower emissions, which benefits the environment. The vast majority of gasoline sold today contains 10 percent ethanol.

"This has got to be so good for the environment," said Jenna Winfield from Sumter. "I think it's a great thing and I hope they continue doing it."

EVEN THE STRIPE GOES GREEN

Darlington Raceway is famous for drivers earning their "Darlington Stripe" by rubbing the outside wall of the track. This year, Darlington Raceway earned its stripe – its Green Stripe, that is. The famed turn 4 on the track "Too Tough To Tame" was painted green a few weeks before the Labor Day Weekend races, showing spectators and drivers that the raceway was using 100 percent Green Power, homegrown here in South Carolina, to power its races. It was also a great way to remind us that it's good to be friendly to Mother Earth. A few lucky fans won rides in a pace car and got to see the Darlington Green Stripe up close as it zipped by the window. You can check out the Darlington Green Stripe video on Santee Cooper's YouTube channel.

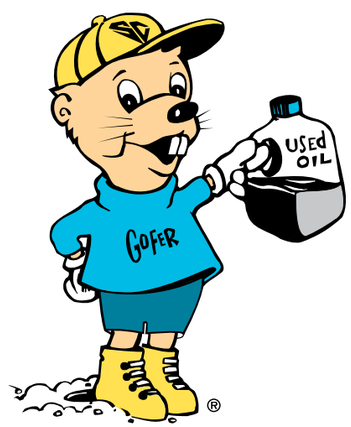




This page, clockwise from left: Creation of the Darlington Green Stripe; Richard Petty signs autographs; fans get a front row seat to all the race action; a last-minute touch-up prior to the race start.

Above: Matt Kenseth's pit crew stands ready to service his Ford.

GOFER



Give Oil For Energy Recovery

NASCAR recycles used oil as one of the ways to be more environmentally friendly. Santee Cooper has a tremendous story to tell about recycling used oil, too, and how all drivers, not just racecar drivers, can participate. The Give Oil For Energy Recovery (GOFER) program offers do-it-yourself oil changers, businesses and farmers with a convenient way to safely dispose of used lubricants. According to the S.C. Department of Health and Environmental Control, it is the largest such program in the state.

Primarily located at county recycling centers, the GOFER program has prevented countless millions of gallons of motor oil, transmission fluid and brake fluid from improperly entering the environment. GOFER began in 1990, the 20th anniversary of Earth Day, and since that time has collected and safely converted into electric power more than 30 million gallons.

Opposite: Chris Buescher (left) in his Chevrolet and Aric Almirola, sporting No. 43 made famous by the legendary Richard Petty, pass by the start-finish line.

Denny Hamlin took the checkered flag.

DARLINGTON'S LONG-STANDING COMMITMENT TO THE ENVIRONMENT

It's not a stretch to say that even before the first asphalt was put down at Darlington Raceway, the environmental impact of building NASCAR's first superspeedway commanded serious attention. And this is nearly seven decades ago when the terms "environmentalist" or "environmentalism" were words for the future.

This is a fish story, but unlike many such tales that tend to grow more dramatic as they're retold, this one is pretty solidly built on fact. In the late 1940s, the vision that would become Darlington Raceway began to take shape in the mind of a local man named Harold Brasington, a peanut farmer.

To build the raceway and bring to life his vision of bigtime stock car racing in the Pee Dee section of South Carolina, he needed a tract of land. The parcel totaled 70 acres owned by Sherman Ramsey, another local. As fate had it, the property contained two small bodies of water: a fish pond and a minnow pond.

Brasington likely viewed these ponds as nuisances, impediments to progress in creating an event to rival the Indianapolis 500. However, Ramsey was insistent that the minnow pond be preserved. Brasington yielded to Ramsey's wishes, which resulted in Darlington's egg-shaped race track, the most unique one on the NASCAR circuit.

The track and the Southern 500 were ready for their debut on Sept. 4, 1950, with the minnow pond presumably undisturbed. Unbelievable as it seems today, 75 stock cars crowded onto the mile and three-eighths long track. Thirty-nine started the race this year.

That first race featured cars of all makes and body styles including Cadillac, Lincoln and Buick. Long-gone independent makes such as Studebaker, Nash, Kaiser and Hudson were in the field, including the also now-defunct brands of Plymouth, Oldsmobile and Mercury. For whatever reason, there was not a single Chevrolet entry, although its archrival, Ford, had eight in the lineup. These were real stock cars from the showroom, only slightly modified, and not the mechanical marvels that today are custom built.

With an average speed of 75.25 mph, Johnny Mantz took the checkered flag in his 1950 Plymouth coupe with a six-cylinder, flathead engine rated at all of 97 h.p. As with most racers that day, Mantz drove his car to and from the track. Attendance was listed as 25,000, impressive for an inaugural event.

This year, a crowd of 60,000 were at Darlington Raceway. The race cars arriving in colorful haulers produce up to 850 h.p. and the qualifying lap speed was almost 178 mph for the race's 68th running. It was billed as Throwback Weekend, with paint schemes from the 1980s on many of the cars.

Carnivorous Plants

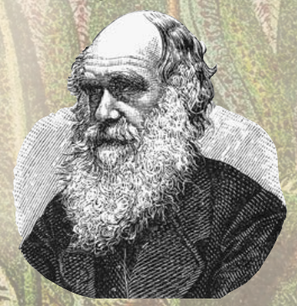
BY PHIL FAIL

Some of the flesh-eating plants native to South Carolina include pitcher plants, sundews and butterworts (left), and Venus' flytraps (this page).

The leafy, man-eating star of "Little Shop of Horrors," Audrey Junior, was alleged to be a cross between a Venus' flytrap and a butterwort, germinated in the coronal glow of the total eclipse of the sun. Strangely enough, if this were even a remote possibility, it would not be Skid Row but the coastal Carolinas that would spawn such a mythical plant-beast, for this is the native range of many types of carnivorous plants. The Lowcountry and Grand Strand are famous for hospitality, yet it is patches of dry, inhospitable, nutrient-poor South Carolina soil that produce these genus-bending floras.

"If you are a plant and you can do one thing in nature just a little different from everything else, like being able to live in dry mineral-deficient soil, your chances for survival are much better," said naturalist and Old Santee Canal Park Director Brad Sale. "So these plants replaced the minerals absent from the soils with minerals from insects."

"THE MOST WONDERFUL PLANTS IN THE WORLD."



Charles Darwin

MOST PLANTS USE PHOTOSYNTHESIS to turn chlorophyll, sunlight and water into sugar, but plants still need minerals to convert the sugars into fats, proteins and nucleic acid compounds the plant can use for food. Without those minerals, most plants would wither and die. However, our carnivorous plant friends are able to thrive in soil where other plants simply cannot. They improvised, adapted and nibbled out, if you will, a niche where they thrive.

And many of them do indeed thrive and hospitably entertain visitors at Santee Cooper's Old Santee Canal Park. Pitcher plants, bladderworts and others claim their space among the native vegetation by adapting to their Lowcountry surroundings.

These adaptations came in the form of specialized leaves that form traps. These plants are divided into groups according to the type of trap they deploy:

Pitfall traps of pitcher plants are leaves folded to make deep, slippery pools filled with nectar and laced with digestive enzymes. In essence, prey steps over the edge of the leaves and slides into the trap.

Flypaper, or sticky or adhesive traps, deployed by sundews and butterworts are leaves covered in stalked glands that exude a sweet sticky mucilage.

Suction traps, unique to the aquatic bladderworts, are highly modified leaves in the shape of a bladder with a hinged door lined with trigger hairs.

Snap traps of the Venus' flytrap and waterwheel plant are hinged leaves that snap shut when trigger hairs are touched.

Lobster-pot traps, also called eel traps, used by corkscrew plants are twisted tubular channels lined with hairs and glands. It's easy for prey to walk into the hair-lined tubes, but nearly impossible for them to walk out. These plants are only found in Central and South America, and Africa.

Pitcher Plants

Pitcher plants are the most common carnivorous plant in coastal South Carolina. The iconic cluster of pitcher-shaped leaves you see above ground is only a part of the plant. They sprout from an underground stem called a rhizome, an excellent survival strategy in fire prone areas. The main body of the plant remains below ground and out of harm's way, allowing it to seize the advantage and quickly sprout anew following fires.

Pitcher plant.

"Think of the palm of your hand as a rhizome, and the upturned fingers as the leaves of the plant we see," explained Sale. "What appears to be a cluster of plants is really a single plant, growing from one rhizome."

Before the specialized pitchers emerge, the plants send out blooms on long stems. One species produces a beautiful yellow flower as big as a fist while others create more delicate, deep-purple blooms. For all, the strategy is to attract bees – not to trap and digest them, at least not yet – that carry the pollen from other individual plants. Flowers have both female and male parts and the goal is for each plant to be fertilized by a different plant.

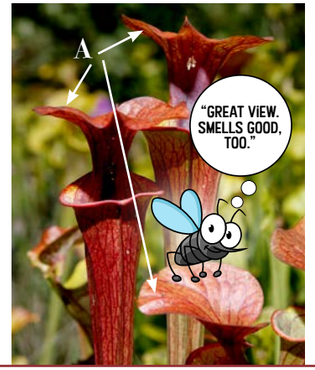
Genetic diversity is key to unlocking adaptations in changing environments. The flower is cleverly built so that the bee or other pollinator enters to brush up against the female stigma, depositing pollen grains from a neighbor as it enters the bloom in search of nectar. After a sticky sip,

Death by Pitcher Plant

PHOTOGRAPHY BY PAUL ZOELLER

STEP 1:

An overhanging top lid called an **operculum (Fig. A)** makes a great landing pad for insects that are lured by just enough nectar to attract their attention. It's like the reader board on the sidewalk advertising today's lunch special.



STEP 2:

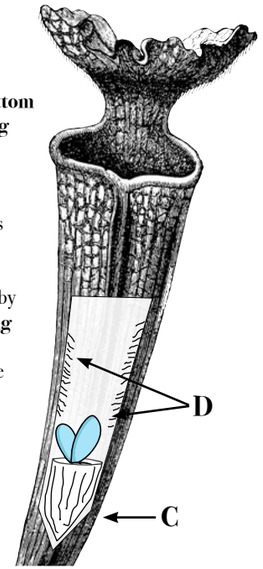
Unsatisfied and wanting more, the beguiled insect moves to the **nectar- rich lip of the pitcher (Fig. B)** where it encounters a slippery wax-like coating.

STEP 3:

The insect slips on the waxy coating and falls into the pitcher.

STEP 4:

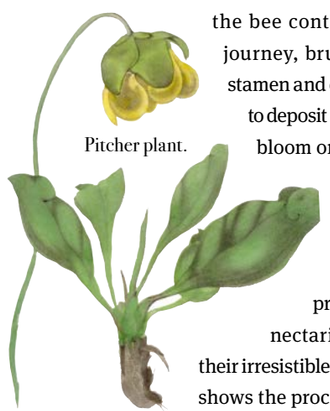
Landing in the **liquid at the bottom of the narrowing tube** (Fig. C), they don't have room to fly out and if the hapless arthropod tries to climb out it'll only to be foiled by **downward facing hairs** (Fig. D). The hairs act like spike strips in a parking lot; try to go the wrong way and you won't get far.



STEP 5 (AKA THE END OF THE LINE)

Eventually the insect drowns in the mix of rainwater and specially evolved enzymes at the bottom of the pitcher. One variety of pitcher plant even produces a coniine, an insect narcotic anesthetic that eases their passage. This compound is lethal to humans, too.

(NOT TO WORRY, THOUGH; WHILE MICE AND OTHER SMALL RODENTS ARE OFTEN FOUND IN THE BELLIES OF PITCHER PLANTS, NO HUMAN REMAINS HAVE YET BEEN DISCOVERED.)



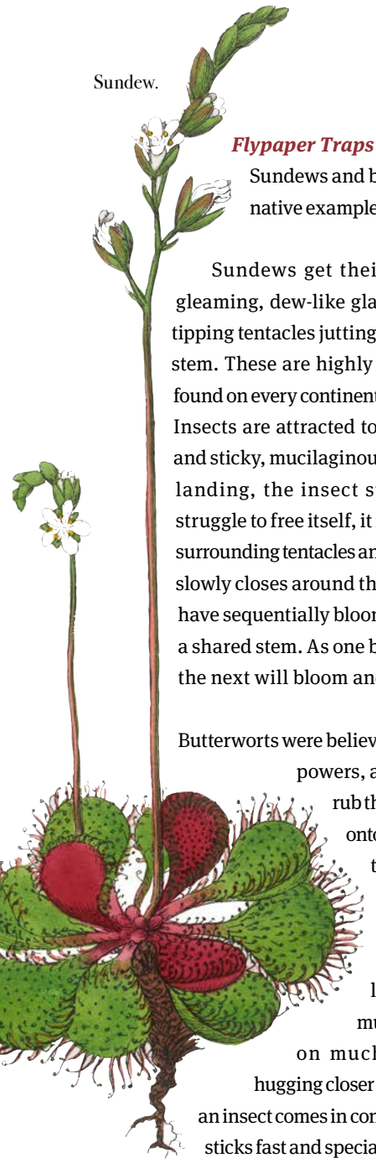
Pitcher plant.

the bee continues on its one-way journey, brushing up against the stamen and collecting pollen grains to deposit on the next pitcher plant bloom on its path.

After the flowers fade, the pitchers use color and nectar-producing glands called nectaries to lure insects into their irresistible trap. The above graphic shows the process.

There are several species of pitchers plants native to coastal South Carolina including:

- **YELLOW TRUMPET PITCHER PLANT**
- **HOODED OR DWARF PITCHER PLANT**
- **SWEET PITCHER PLANTS**
  (which are smaller and smell better)
- **PURPLE PITCHER PLANTS**
  (also known as frog's breeches and hunter's horn)



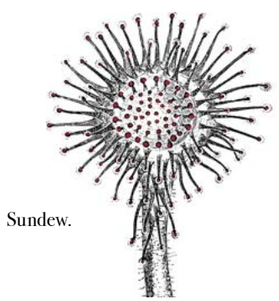
Sundew.

Flypaper Traps

Sundews and butterworts are our native examples of flypaper traps.

Sundews get their name from the gleaming, dew-like glands that look like tipping tentacles jutting out from the main stem. These are highly adaptable plants, found on every continent except Antarctica. Insects are attracted to the plant's sweet and sticky, mucilaginous secretions. Upon landing, the insect sticks fast. In the struggle to free itself, it is entangled in the surrounding tentacles and the sundew's leaf slowly closes around the victim. Sundews have sequentially blooming flowers along a shared stem. As one blooms and closes, the next will bloom and close and so on.

Butterworts were believed to have magical powers, and farmers would rub the juice of the leaves onto milk cows' udders to make their butter better. Smaller than sundews, they also have leaves covered with mucilaginous glands on much shorter stalks hugging closer to the leaves. When an insect comes in contact with the leaf, it sticks fast and specialized glands on the leaf surface release digestive enzymes that make short work of the prey.



Sundew.

Suction or Bladder Traps

Bladderworts are a floating group of aquatic plants boasting more than 225 species worldwide. They all sport highly modified round leaves, or stolons, largely regarded as the most sophisticated trapping mechanism of any carnivorous plant. To set the trap, the water in the bladder leaves is pulled back into the stem, flattening the bladders and creating a vacuum. When prey contacts a trigger hair near the bladder door, it springs the trap, and the plant sucks in prey and surrounding water in as little as 1/50th of a second. The trapped prey is generally microscopic, like protozoa. Once caught, they are then bathed in digestive secretions. Bladderworts are found in fresh and brackish water all over coastal South Carolina including in Old Santee Canal Park.

Butterwort.

Snap traps

The "rock stars" of carnivorous plants have to be the Venus' flytraps. They deploy an active trap, meaning they actually have to move to entrap the insect. Venus' flytraps are very small and closely hug the ground. They are highly specialized to survive in dry, nutrient-deficient soil.

When they first emerge, they are completely green. As they grow, the pads, or "mouth" where the plant produces digestive enzymes, begin to turn red. From these pads emanate three trigger hairs. If a single hair is touched more than once in a quick secession or if more than one of these hairs is touched, the trap is sprung and closes around the hapless visitor.

It's all done without the aid of a brain or muscles. It's the magic of water pressure or hydraulics. The inside of the trap is comprised of densely packed cells. When tripped, the cells are triggered to fill with water. As the cells expand, the trap closes, and you know the rest.

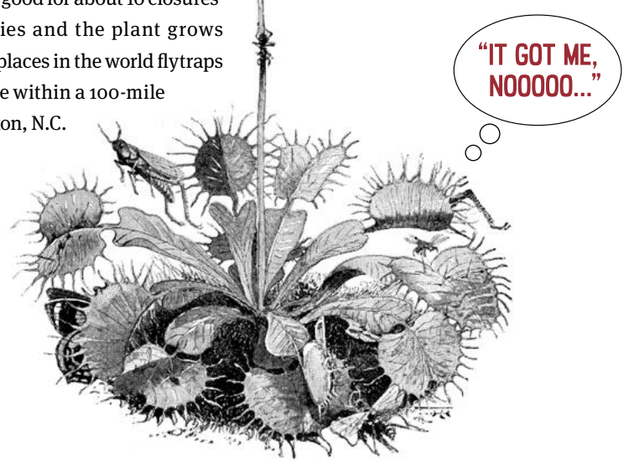
If an insect escapes or if the trap misfires, the plant senses it's been skunked. It reabsorbs the water and the flytrap reopens, ready to try again. Each trap is good for about 10 closures before the leaf dies and the plant grows another. The only places in the world flytraps occur naturally are within a 100-mile radius of Wilmington, N.C.

Venus' flytrap.

"The Venus' flytrap doesn't compete well with other plant species. It grows low to the ground and finds itself in the shadow of taller plants and robbed of life-giving sunlight," said Parker Hill, Santee Cooper's supervisor of right of way management. Santee Cooper controls undesirable vegetation under transmission lines in the Lewis Ocean Bays Heritage Preserve in Horry County, a place where Venus' flytraps thrive.

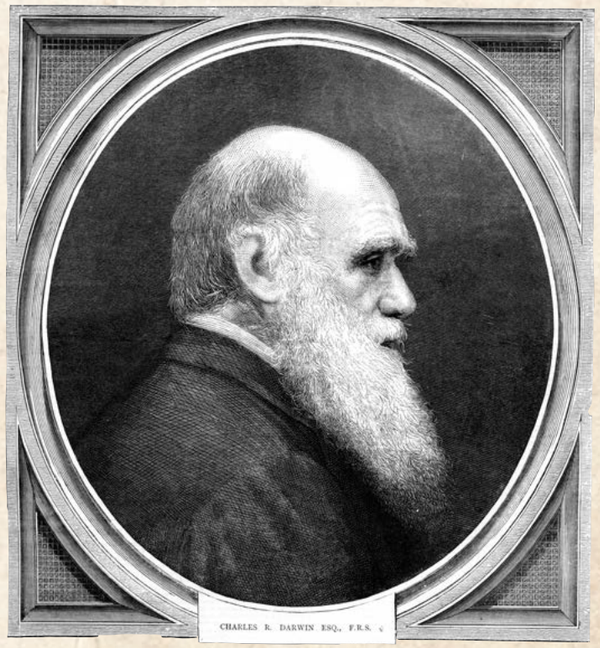
To help protect the flytrap's place in the ecosystem, Santee Cooper joined forces with Coastal Carolina University in 2004 to study the impact of our vegetation management practices in rights of way that cross Lewis Ocean Bays Heritage Preserve.

"Today we employ selective spraying in those areas, which promotes the flytraps," Hill said.



IN THE END, humans have nothing to fear from these plants. The plants, however, have plenty to fear from us. Human intrusion and natural systems modifications, like fire suppression, are the biggest threat to continued survival of carnivorous plants. Habitat loss from land clearing, agriculture, the illegal collection of wild plants, pollution and incautious herbicide application all pose a considerable threat. In the end, it's best we embrace the words of Charles Darwin:

"THE LOVE FOR ALL LIVING CREATURES IS THE MOST NOBLE ATTRIBUTE OF MAN."



WORLD'S WORST AQUATIC INVASIVE PLANT!

By
Raechel Blitchington,
Public Relations Intern

Photography by
Paul Zoeller

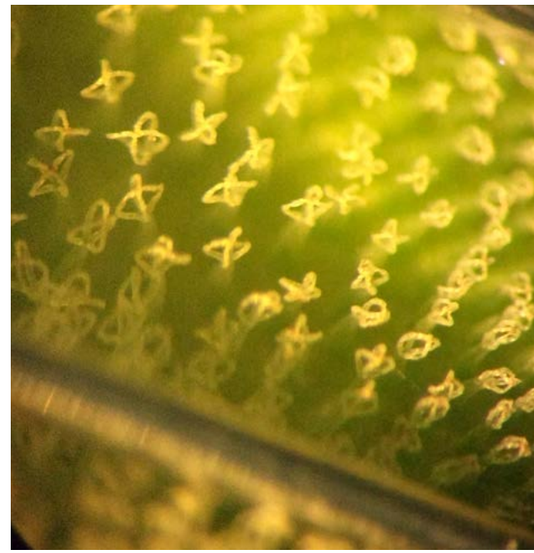
FOR CASEY MOORER AND ERNIE GUERRY, WHAT BEGAN AS ANOTHER ROUTINE BOAT SURVEY IN LAKE MARION QUICKLY TURNED OMINOUS AT ELLIOTT'S LANDING, WHERE GUERRY DISCOVERED A DIFFERENT PLANT LURKING BETWEEN THE MIX OF DUCK WEED AND CRESTED FLOATING HEART.

Guerry pointed out the plant to Moorer. "My response was, 'I hope that's not what I think it is,'" said Moorer.

Both Moorer and Guerry work for Santee Cooper, which is responsible for managing lakes Marion and Moultrie. Upon first glance Moorer, the supervisor of biological services, and Guerry, environmental technician for environmental resources, identified the species as either common salvinia, *Salvinia minima*, or giant salvinia, *Salvinia molesta*.

"Last year we found common salvinia, or *Salvinia minima*, which is much less aggressive than giant salvinia, on upper Lake Marion. I was hoping that what we found at Elliott's Landing was common salvinia," explained Moorer.

Guerry and Moorer took some samples to the lab. The microscope confirmed their fears, showing the plant had touching hair-like structures that form a resemblance to egg beaters.



Above:
A microscopic view of the leaves of giant salvinia.

The plant, which is native to Brazil, entered the United States in the 1990s through the horticultural trade. Since its introduction, salvinia has been discovered throughout the Southeast from Texas to North Carolina.

Opposite:
Giant salvinia (Salvinia molesta) as seen on Lake Marion.

Giant salvinia is a serious threat to freshwater systems and is a significant concern for lakes Marion and Moultrie, and those who enjoy them.

"Salvinia molesta is a very aggressive plant that has been labeled by some in the industry as the 'World's Worst Aquatic Invasive Plant,'" said Santee Cooper Environmental Resources Manager Larry McCord.

This particular species is infamous for its rapid growth across water surfaces and its formation of dense floating mats up to 3-feet thick. The aggressive growth prevents light from reaching other plants, depleting oxygen levels and degrading water quality for fish and other aquatic organisms.

Opposite: Santee Cooper Environmental Resources Manager Larry McCord examines a patch of Salvinia molesta entwined with crested floating heart during a patrol of Lake Marion.

Employees with Santee Cooper's environmental services estimate giant salvinia has spread across 3,900 acres in upper Lake Marion.

"That does not mean that the lake is covered with 3,900 acres of Salvinia molesta. This plant is free-floating, so it moves wherever wind, water, boat traffic or wildlife takes it. Right now, the giant salvinia is scattered and getting caught up in the crested floating heart in the area," said Moorer.

Unfortunately, there are no known biological control agents available to help control the plant. Grass carp, which are used for controlling hydrilla, another non-native, nuisance aquatic plant, do not eat salvinia. Moreover, an insect that feeds on salvinia in South America, salvinia's native continent, would not survive South Carolina's winter temperatures.

Scott Lamprecht, fisheries freshwater coordinator for the South Carolina Department of Natural Resources, said, "From my perspective, Salvinia molesta is capable of taking over huge parts of the lake and preventing recreational use. This species can be eradicated, but it's going to take a lot of hard work due to its ability to hide in small quantities in different areas."

Controlling Invasive Plants

Twelve years ago, employees with Santee Cooper's analytical and biological services department made an aquatic nuisance species discovery when they found crested floating heart. At the time, crested floating heart was determined to be the most aggressive, floating-leaf plant encountered on the lakes. Originally from Asia, the plant is extremely invasive and can quickly overtake a waterway. The upstream colonization of the crested floating heart is attributed to its tendency to latch on to boat hulls, allowing it to be transported to new areas of the Santee Cooper Lakes. Due to crested floating heart's ability to withstand treatment with commonly used herbicides, controlling the plant has been very difficult.

However, after over a decade of large-scale treatments, Santee Cooper successfully reduced the crested floating heart population. Nearly continuous treatments are still applied along residential shorelines, near commercial facilities and in important wildlife habitat areas.

In addition, the battle against hydrilla in the lakes continues since its 1982 discovery in Lake Marion. In 1989, Santee Cooper began stocking

Below: The distinctive purple flowers of water hyacinth (Eichhornia crassipes), another common sight on Lake Marion (left).

Salvinia molesta can be identified by its light to medium green, nearly round leaves on branched stems (right).

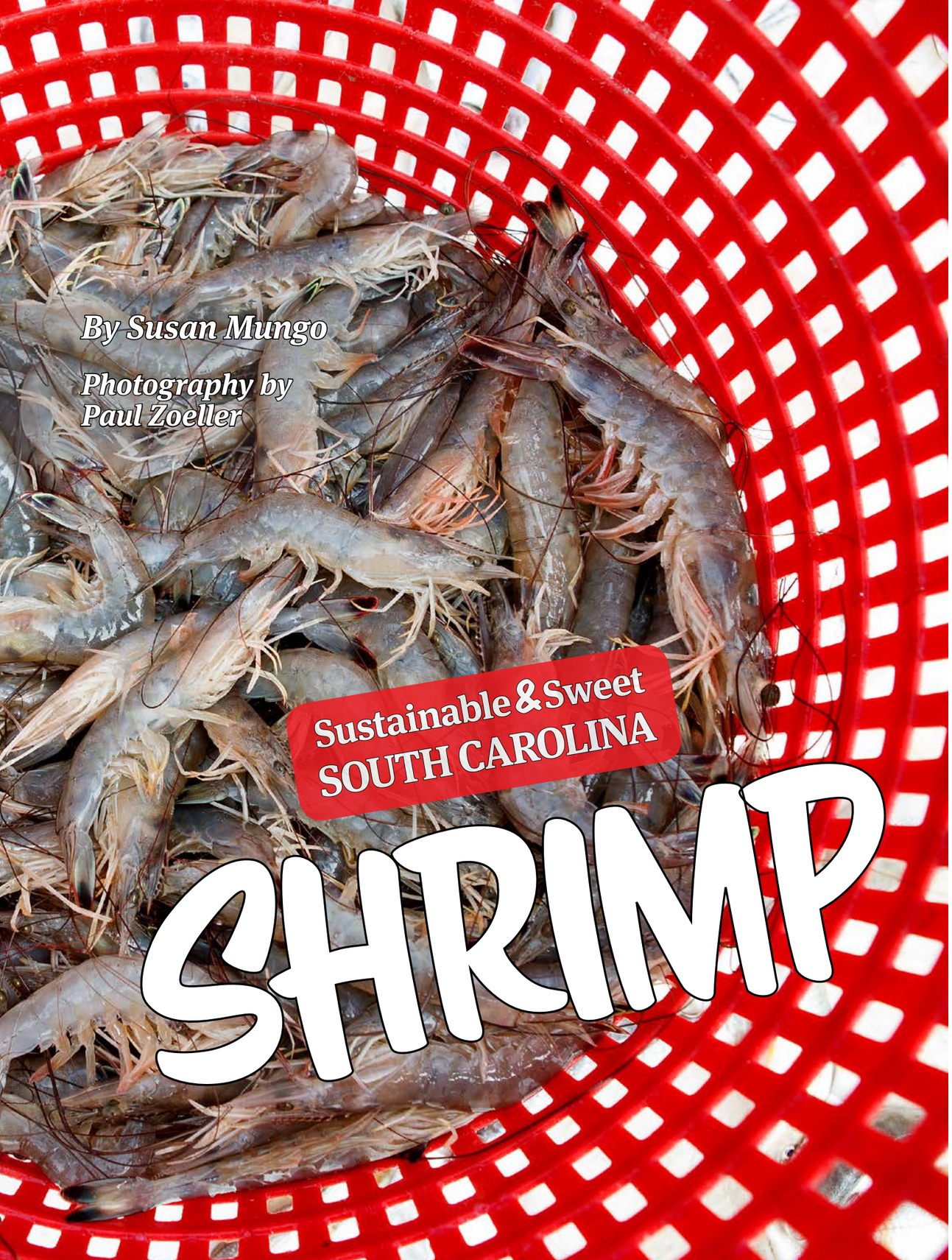
"THIS SPECIES CAN BE ERADICATED, BUT IT'S GOING TO TAKE A LOT OF HARD WORK DUE TO ITS ABILITY TO HIDE IN SMALL QUANTITIES IN DIFFERENT AREAS."

grass carp in the affected areas of the lake to feed on the hydrilla. After five years, the system-wide reduction of hydrilla was evident. Maintaining control of this aggressive, submersed aquatic plant continues to be a challenge, and grass carp populations are adjusted yearly to keep the plant from rapidly spreading.

Water hyacinth, first discovered in Lake Marion in 1994, also continues to be a periodic problem in the lake system. Temperatures below freezing will kill the plant, if freezing occurs at the water surface. South Carolina had a mild 2016 winter, resulting in the treatment of nearly 1,000 acres of water hyacinth to date this year.

Though all invasive aquatic plant species are experts at spreading effectively on their own, boaters can help prevent their spread by being aware of the different species and checking boats and trailers regularly.

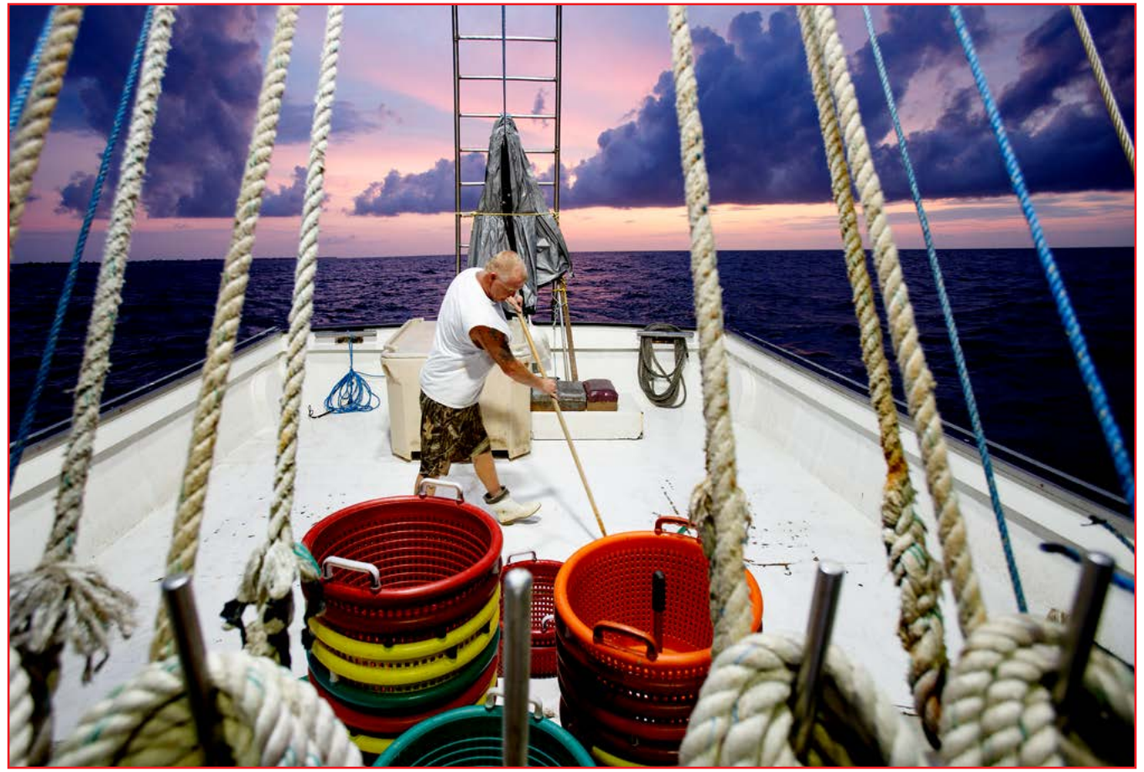
While boaters are doing their part, Santee Cooper is committed to doing its part, making sure the Santee Cooper lakes are as healthy as they can be.



By Susan Mungo

Photography by Paul Zoeller

Sustainable & Sweet SOUTH CAROLINA SHRIMP



Above: Michael Turner, first mate, prepares the deck while heading out to sea.

FOR MANY, hearing the word shrimp brings to mind the infamous segment from Forrest Gump where Bubba is describing all of the ways he enjoys shrimp. In the story, Gump bought a shrimp boat and found shrimping was not only a way to catch a delicious meal, it was also a way to make a living for his family.

For centuries, families along the South Carolina coast have enjoyed fresh Carolina shrimp, often purchased on a dock right off the boat. No matter how you like your shrimp prepared, it is always a little better when the shrimp are freshly caught.

South Carolina Department of Natural Resources (SCDNR) officially opens and closes shrimp season depending on shrimp numbers, growth and development. In South Carolina there are different time frames for the official shrimp season with white and brown shrimp caught during three peak periods. White roe shrimp are caught in spring, brown shrimp in summer, and white shrimp that are the offspring of spring shrimp are caught in fall/winter.

"Shrimp are a sustainable food source, but local shrimp populations can change from year to year due to environmental factors. Unusually cold winters resulting in colder than average coastal water temperatures can significantly diminish the abundance of overwintering shrimp in our waters," said Mel Bell, director of SCDNR's Office of Fisheries Management.

According to Bell, the overall condition of our coastal estuaries is also very important to the long-term health and sustainability of shrimp. Saltwater marshes and tidal creeks serve as nursery areas where young shrimp grow up. Excessive freshwater input impacting salinity, chemicals from freshwater runoff, and loss of healthy marsh grasses from coastal development can have an adverse effect on the shrimp's ability to grow.

GLENNIE TARBOX knows a thing or two about seafood. His father Herbert Tarbox started Independent Seafood in Georgetown in 1939. Glennie took over in 1959 and still oversees the thriving business his father started. His son-in-law, "Cotton" Williams, now handles the day-to-day operations at the fresh seafood market.

"Market conditions have changed drastically," said Tarbox. "Ten to 12 years ago we started downsizing our shrimp operations because of the influx of farm-raised shrimp and shrimp imported from outside the country. That, combined with the rising cost of fuel, has made it harder for our local shrimpers to be competitive."

As a result, the family has seen the shrimp business decline. Instead of approximately 20 shrimp trawlers at their dock, they are down to about five. Williams said they still offer a desired commodity and make a difference in the local economy.

Even with the changes in the market, both Tarbox and Williams said they are committed to owning a successful small business to provide a living for their families and their employees while offering fresh, locally caught seafood.

"We maintain a good relationship with the local shrimpers and believe we offer the best locally caught shrimp available," said Williams.

Larry Owens' boat, the Capt. Andrew, calls South Carolina home. The Capt. Andrew was built in Georgetown 48 years ago by his wife's family. Owens has been shrimping for 42 years and he and his sons still take the 75-foot, hand-crafted trawler off the coast to gather shrimp for local markets, including Independent Seafood. He has survived the ups and downs of the business, and he plans to drag for shrimp off the coastline for many years to come.

This page: Jeff Scott and Michael Turner cull through the haul they have pulled.

Clockwise from top left: Glennie Tarbox greets every customer with a smile at Independent Seafood, including Wilbur the egret who shows up for his daily snack. Cotton Williams weighs and bags shrimp for customers at Independent Seafood. Larry Owens steers the Capt. Andrew, which has been shrimping local waters for almost five decades. Charlie Bryant and Jeffery Pollock assist customers who want the freshest shrimp they can find.

ROBERT LEGGETT is a retired shrimp boat captain whose first experience shrimping was pulling a net behind a small skiff at the age of 12. He went on to own three full-sized shrimp boats during a career that spanned more than three decades. Leggett spent many days shrimping off the shores of North Myrtle Beach, Kiawah and Beaufort. Leggett said some days at sea were great and profitable. He recalled his best day as one when he made one drag and then docked his boat with 3,000 pounds of shrimp, the biggest catch of his career.

Increasing costs to operate and a decrease in demand for local shrimp eventually led to Leggett's retirement. "Shrimping has been more than just a way for me to enjoy the freedom and peace I feel when I am on the ocean," said Leggett. "It provided a living for my family for 35 years."

Shrimping can be an expensive business. Trawlers require upkeep like replacing nets, boat maintenance, fuel and paying employees that could put a strain on the profit margin for a boat owner or operator. According to SCDNR records, about 400 trawlers are currently commercially licensed in the state, which is about one-fourth of its peak two decades ago.

Mark Richardson is a man who loves the salt air and the fact there are no horns or traffic lights at sea. A boat captain, Richardson has been in the shrimping industry for decades, catching his first shrimp with a cast net at the age of 15. Now he and his brother, Paul, own and operate two shrimp trawlers that dock at Shem Creek in Mount Pleasant. Richardson said he believes the decline in boats docking at Shem Creek is a result of the price of imported and farm-raised shrimp products, but he feels the winds may be changing.

"Things have been tough but I do believe local business is on the rebound, and I have seen more boats in Shem Creek in the last couple of years," Richardson said. "We still face challenges in our business, but our goal is to continue to deliver a fresh product to our market in Charleston and here in Shem Creek in the hope that we can sustain this way of life for many generations to come."

Local, fresh-caught shrimp are a sustainable, low-fat, low-carbohydrate, low-calorie and high-protein food source. Some make a living by catching shrimp, but others are in the business of making a living by cooking shrimp.

In Georgetown, local businesses buy their products straight from the docks and markets. Bucky and Angie Watkins have owned and operated the Big Tuna Raw Bar for 16 years and have always provided a locally caught product. The same goes for many restaurants up and down the coast. That means restaurant goers can enjoy their shrimp cocktails while watching the fishermen tie up or cast off.

Casey Kuzmik is a manager at Crab Catchers in Little River. It's a fresh local seafood market and restaurant that will cook the catch of the day for you while you watch the next haul being unloaded from the boat.

"It is one thing to think you are eating fresh caught shrimp and fish," said Kuzmik. "But when people actually see it pulled from the boats onto the dock here at the restaurant, they know what they are enjoying on their plate is as fresh as it gets."

Shrimp recipes – cook, savor and share!

Carolina Lowcountry Shrimp Boil
www.food.com/recipe/carolina-low-country-shrimp-boil-311478?nl=email_share

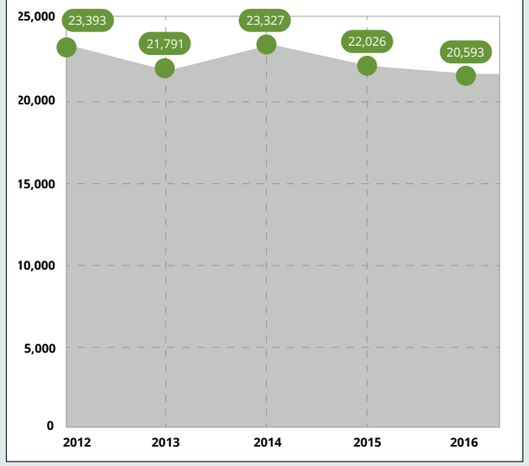
Michelle's Shrimp and Grits
http://www.myrecipes.com/recipe/michelles-lowcountry-shrimp-grits

South Carolina Shrimp Gumbo
https://www.bigoven.com/recipe/south-carolina-shrimp-gumbo/59810

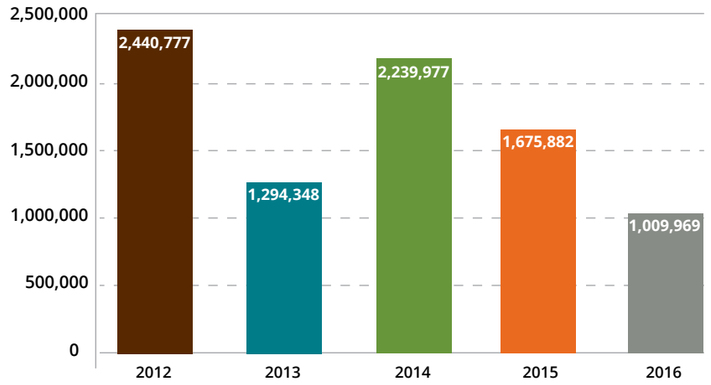
A delicious blackened shrimp cocktail is served at Big Tuna Raw Bar, a restaurant in Georgetown that serves fresh, locally harvested shrimp.

ENVIRONMENTAL REPORT 2017

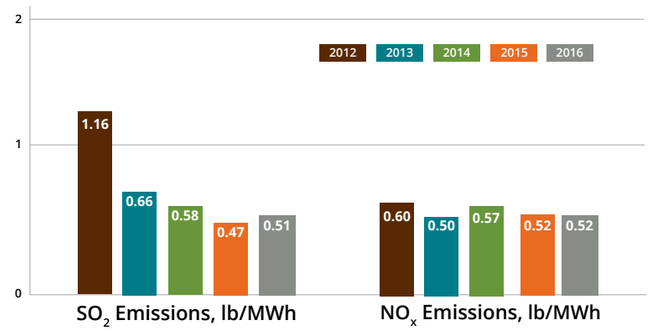
Total Generation, GWh



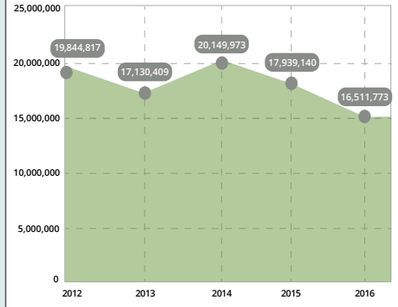
Estimated Reportable Total TRI Releases



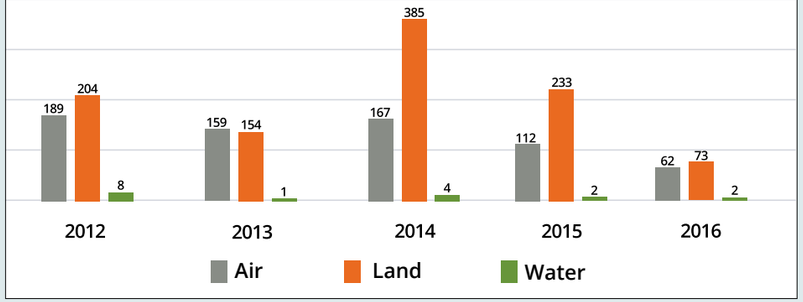
SO_2 and NO_x Emissions, lbs./MWh



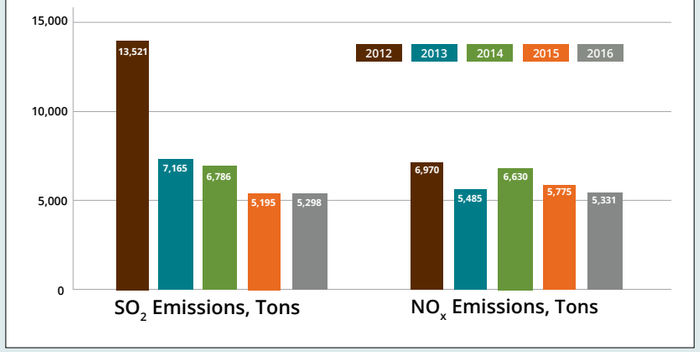
CO_2 Emissions, Tons



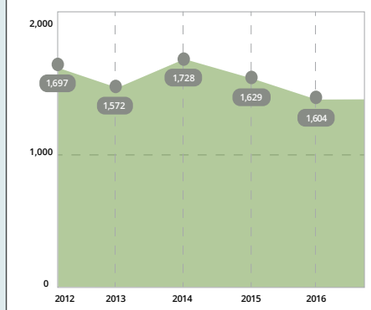
Estimated Reportable Mercury Releases, lbs.



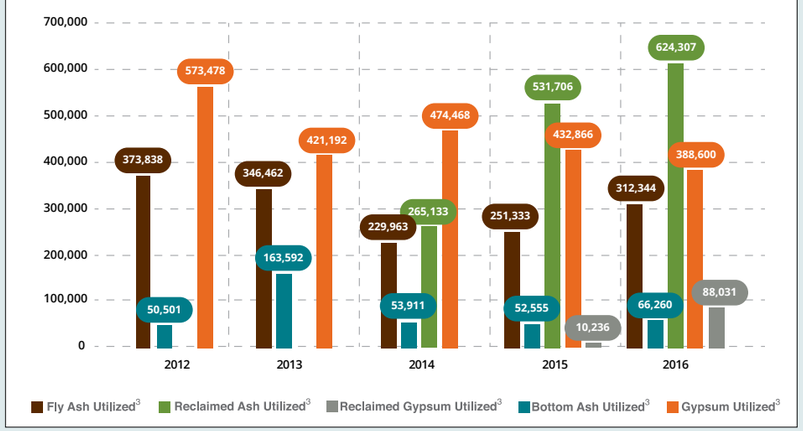
SO_2 and NO_x Emissions, Tons



CO_2 Emissions, lbs./MWh



Coal Combustion Products Utilization



CHANTS UP FOR GREEN POWER!

Coastal Carolina is proud to partner with Santee Cooper and Horry County Solid Waste Authority to bring you the CCU Chants Up for Green Power Game.

The CCU game against Georgia Southern will run on 100 percent Santee Cooper Green Power that was born right here in Chanticleer territory at the Horry County Solid Waste Authority.

For tickets, go to **GoCCUsports.com/ ChantsUp4GreenPower**.

For more information on Santee Cooper Green Power, go to **www.santeecooper.com/ greenpower.**

DECEMBER 2

CCU VS GEORGIA SOUTHERN

Official game sponsor is Horry County Solid Waste Authority